

ABSTRACT OF THE DISCLOSURE

The speed at which optical networking devices operate is increased with the present invention with integrated circuits that provide both optical and electronic functions. The present invention provides highly integrated p-i-n or p-i-n-i-p photodetectors and heterojunction bipolar transistors for amplifying photodetector signals formed from a single semiconductor layer stack. The techniques are applicable for the integration of all InP-based and GaAs-based single-heterojunction bipolar transistors and double-heterojunction bipolar transistors. The photodetectors and transistors are formed from common layers, allowing them to be manufactured simultaneously during a processing of the stack. Integrating these components on a single circuit has the potential to greatly increase the speed (in excess of 40Gb/s) and to decrease the cost of high-speed networking components through the development of compact optical circuits for optical networking. The present invention also includes the inclusion of a reflecting stack of semiconductor layers below the photodetector to increase the responsivity of the detector.